Human Cost
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Mortality and survival rates give a partial picture of the burden of cancer deaths in a population. Years of life lost (YLL) due to premature death from cancer were calculated to provide an additional dimension to the description of the burden of disease.[1] SEER AYLL estimates for 2001 are produced using United States Life Tables, 2001; National Vital Statistics Reports from the Centers for Disease Control and Prevention. Person-years of life lost (PYLL) were calculated for this report as follows: For each of the individuals who died of a particular cancer, it was possible to obtain the number of additional years they were expected to live, based on their gender and race, had they not died of cancer and conditional on their surviving to the age at which they died of cancer. Life expectancy data were obtained from the National Center for Health Statistics (NCHS).[2] One-year intervals were used in the calculations.[3] The number of deaths at each age was multiplied by the average years of life remaining for a person of that sex, race and age to estimate the number of years of life lost for all people of that age dying of the particular cancer.[4] These years of life lost were summed across ages for each of the sites to get the estimate of PYLL.[1]

Also presented is the average years of life lost (AYLL), calculated by dividing the PYLL by the total number of deaths.[1] Average years of life lost are compared between blacks and whites for each cancer site, and SEER estimates of AYLL for the United States are compared to estimates of Michigan's AYLL.

Summary

Figure 1 shows the total number of person-years of life lost by cancer site in Michigan in 2003. The greatest number of person-years of life lost was due to lung cancer deaths; the total number of person-years lost was 88,476. Breast cancer was responsible for the next greatest number of person-years of life to be lost, costing 27,758 total person-years. This was followed by colorectal cancer, which caused 23,351 person-years of life lost. Prostate cancer cost 9,346 total years of life, and cervical cancer was responsible for 2,476 years of life lost. Figure 2 traces the total number of person-years of life lost by cancer site over time from 1989 to 2003.

Looking at the total person-years of life lost is one measure of the impact of various cancers on the population as a whole. Alternatively, the average years of life lost per death due to cancers at each of the selected sites reveals an aspect of the burden of cancer on individuals. Figure 3 shows the average years of life lost by cancer site over time from 1989 to 2003. In Figure 4, average years of life lost by Michigan residents in 2003 by cancer site are shown next to the average years of life lost nationally in 2002. Although cervical cancer caused the fewest person-

[1] Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). *SEER Cancer Statistics Review, 1975-2002*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2002/, based on November 2004 SEER data submission, posted to the SEER web site 2005.
[2] United States Life Tables, 1985-2002; National Vital Statistics Reports from the Centers for Disease Control and Prevention.
[3] The Life Tables for years 1997-2002 show expected years of life remaining for ages zero to 100, but Life Tables for years 1985-1996 show expected years of life remaining only for ages zero to 85. In order to calculate years of life lost for people dying of cancer after age 86 in years prior to 1997, the years remaining in the 1997 Life Table for ages 86 to 100 years were used to fill in these values for the 1985-1996 calculations. Because the 2002 Life Tables are the most recent year available, they were used in calculating the person-years of life lost in 2003.
[4] Michigan Resident Death Files, Michigan Department of Community Health (MDCH), Division for Vital Records and Health Statistics.

years of life to be lost in the total population, of the five sites it has the greatest average number of years of life lost in Michigan, with an average of 23.8 years lost per person with this disease. There were a small number of cervical cancer deaths relative to deaths due to cancer at one of the other four sites presented in this report, so the total sum of person-years of life lost from all of the deaths is small despite the comparatively large number of years of life lost with each individual death. Breast cancer had the next highest average cost in years of life lost of the five sites, causing an average loss of 19.5 years per death. Years of life lost due to lung cancer averaged 15.6 per death, and those dying of colorectal cancer lost an average of 13.1 years of life. Prostate cancer deaths caused an average loss of 9.5 years per person with the disease.

The estimated average numbers of years of life lost due to the five selected cancer sites for Michigan in 2003 were similar to that of the SEER estimates for 2002. On average, slightly fewer years were lost due to cervical and colorectal cancers in Michigan than in the United States overall. Estimates of average years of life lost due to breast, lung, and prostate cancers were higher for Michigan than the United States averages.

In Figure 5, average years of life lost due to cancer at each of the five sites is shown by race. Averaging years of life lost per death, blacks lost more years of life than whites from breast cancer (21.0 and 18.8 years per person), colorectal cancer (15.7 and 13.5 years per person), lung cancer (15.9 and 15.3 years per person), prostate cancer (9.9 and 9.2 years per person), and cervical cancer (24.4 and 22.9 years per person).

Other than years of life lost, estimates of the human costs of cancer are scant. Morbidity indicators for the cancer patient such as losses of work or school time, and periods of restricted activity due to the disease are difficult to measure. In addition, there are significant human and financial costs to family members and other caregivers who give up activities, opportunities, and income to provide assistance to cancer patients. To date, no such data have been identified for the cancers of interest here.

Figure 1.

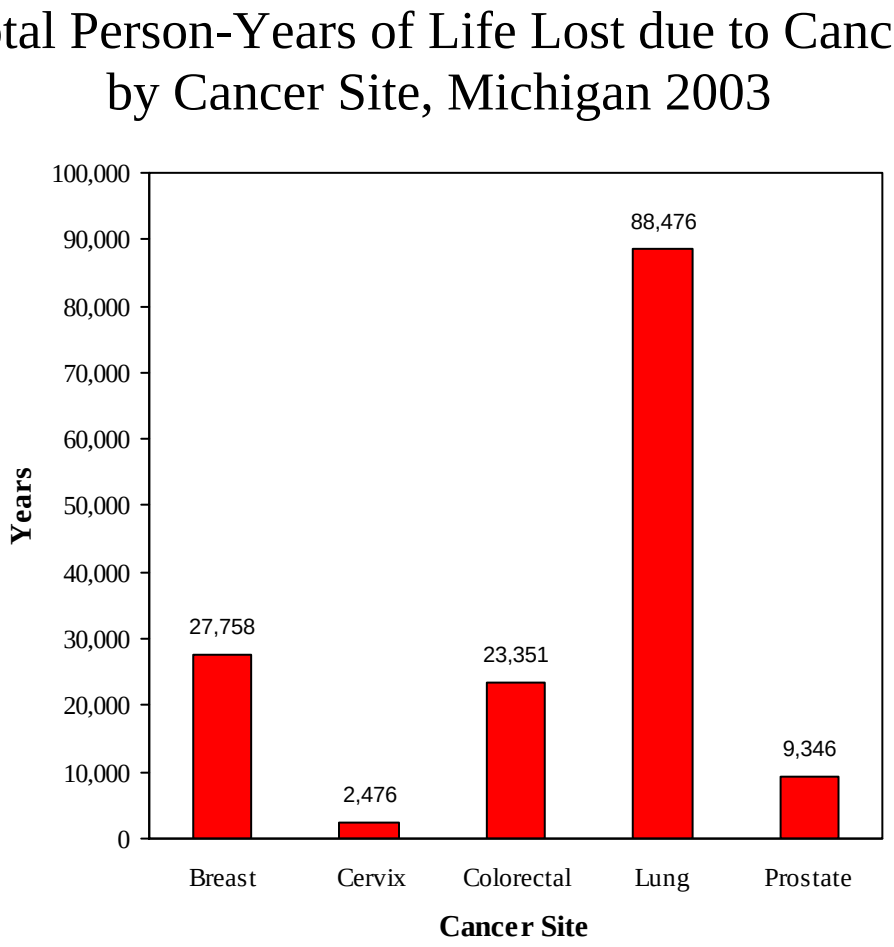

Total Person-Years of Life Lost due to Cancer
by Cancer Site, Michigan 2003
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Years
27,758
2,476
23,351
88,476
9,346
Breast
Cervix
Colorectal
Lung
Prostate
Cancer Site

Figure 2.

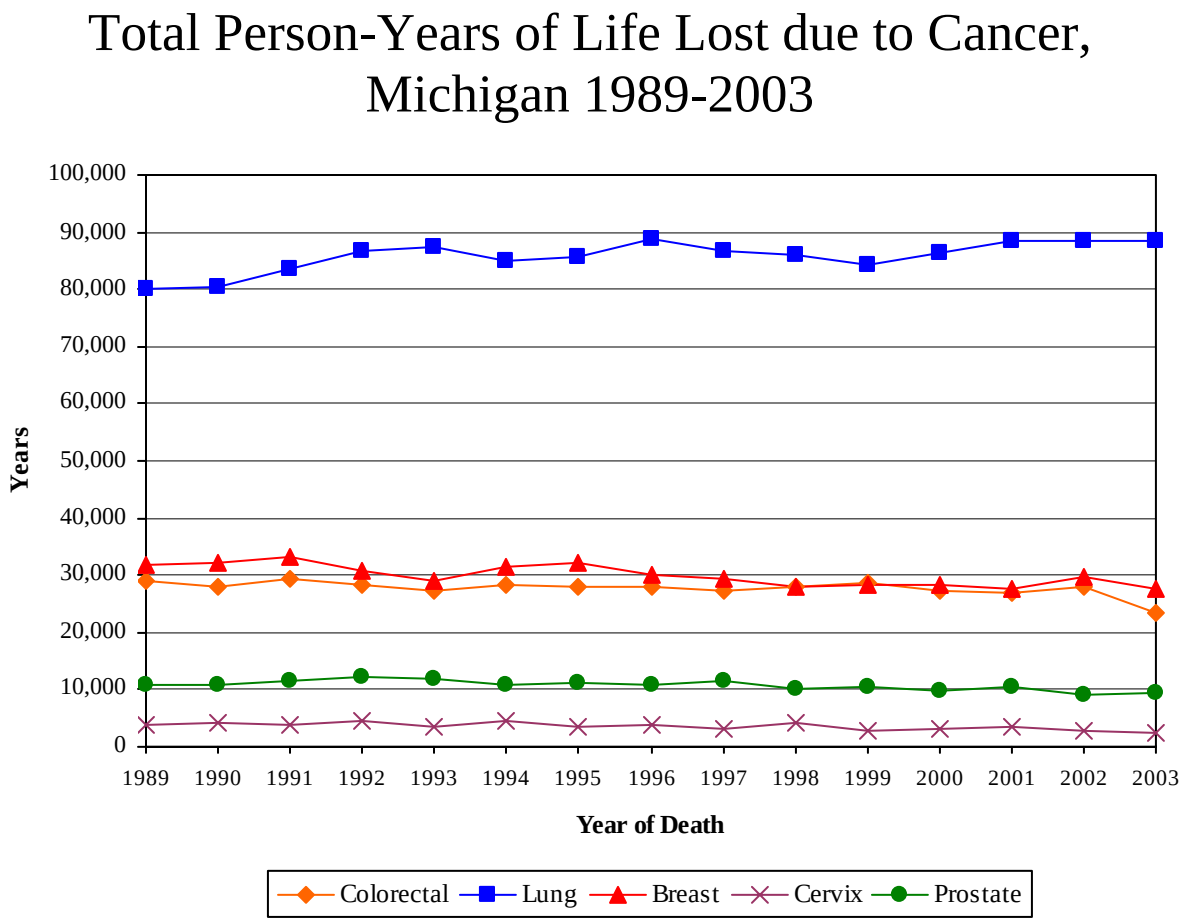

Total Person-Years of Life Lost due to Cancer, Michigan 1989-2003
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Years
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Year of Death
Colorectal
Lung
Breast
Cervix
Prostate

Figure 3.

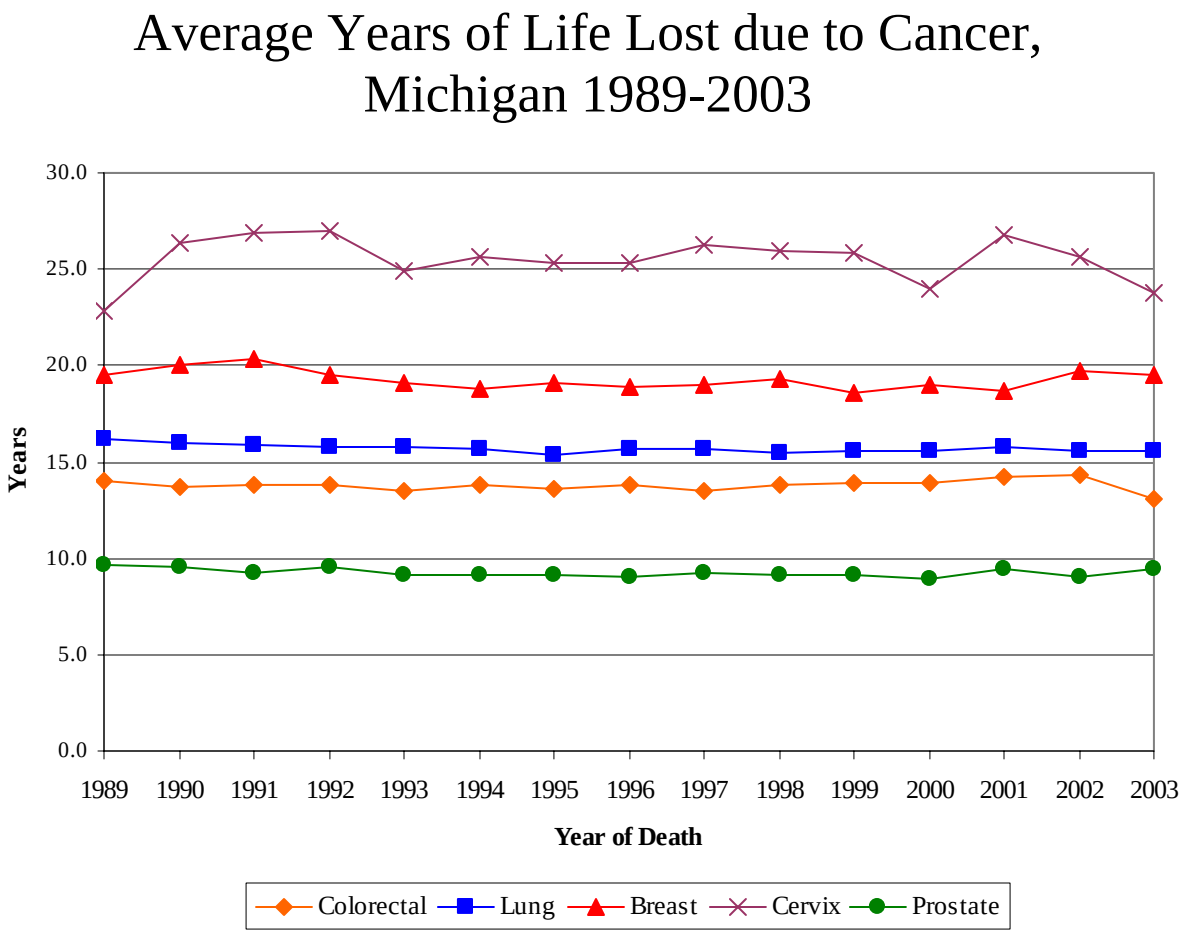

Average Years of Life Lost due to Cancer, Michigan 1989-2003
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Years
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Year of Death
Colorectal
Lung
Breast
Cervix
Prostate

Figure 4.

Average Years of Life Lost by Cancer Site
Michigan 2003 and US 2002

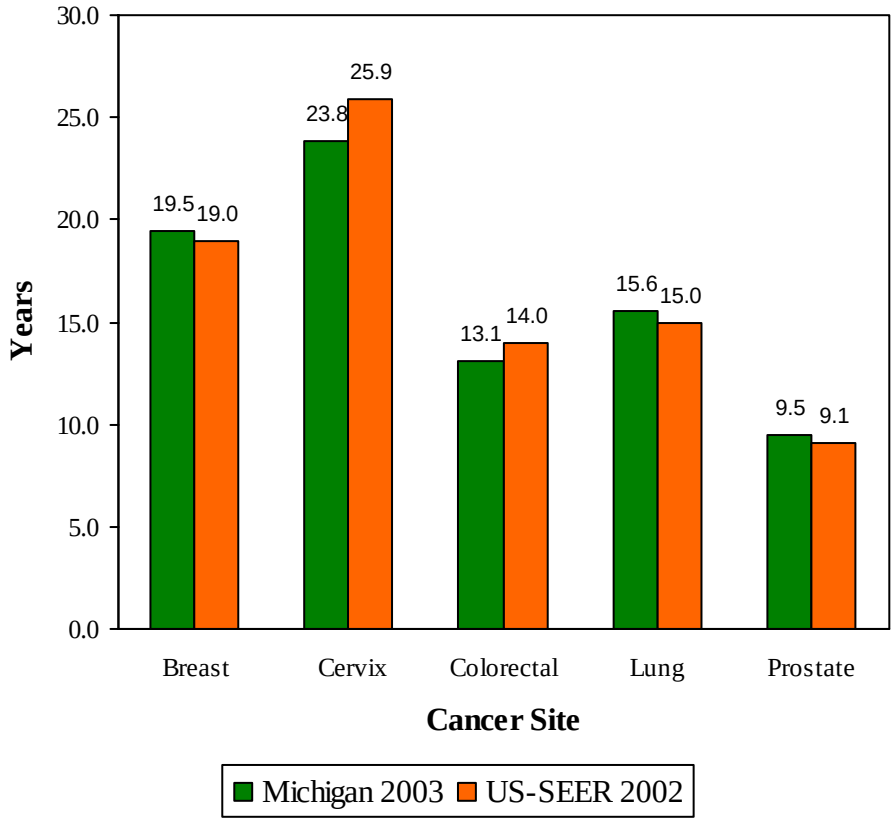
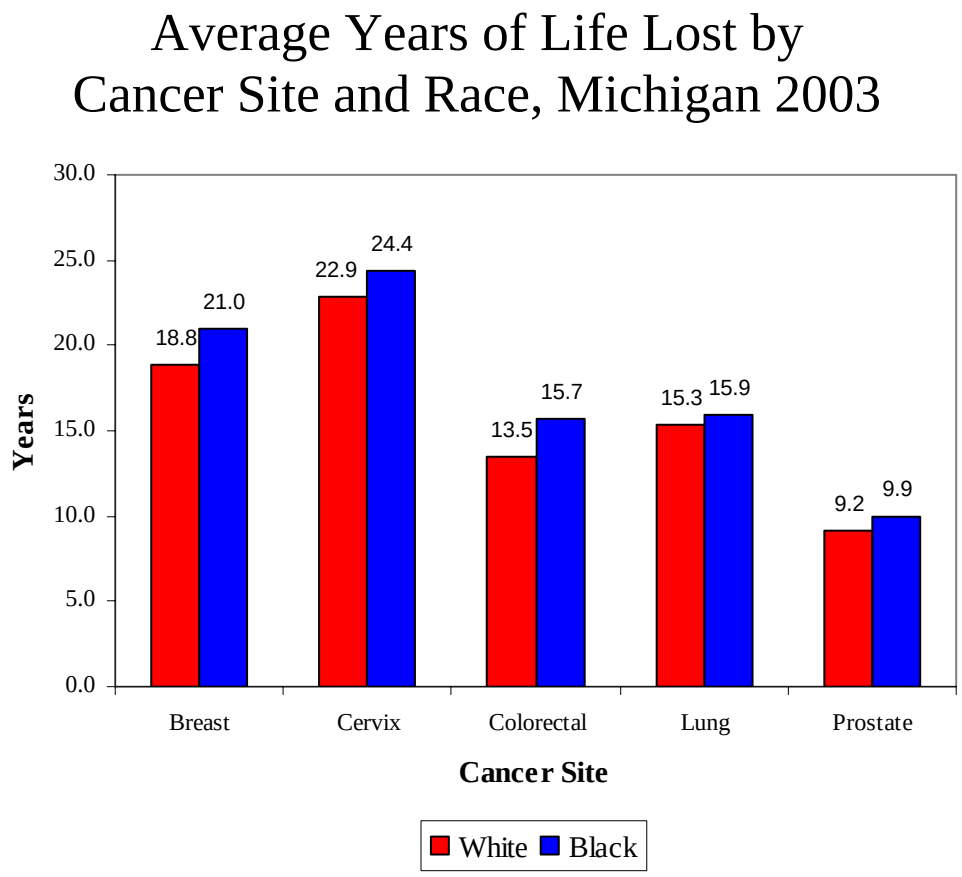


Figure 5.


Average Years of Life Lost by
Cancer Site and Race, Michigan 2003
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Years
18.8
21.0
22.9
24.4
13.5
15.7
15.3
15.9
9.2
9.9
Breast
Cervix
Colorectal
Lung
Prostate
Cancer Site
White
Black